

HW Solns #3

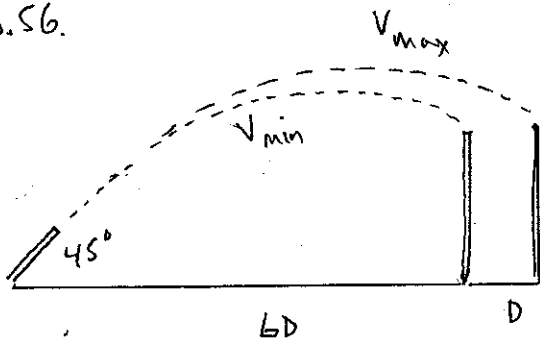
3.8

const speed

increasing speed
BOTTOM TO TOP

decreasing speed
BOTTOM TO TOP

3.56.



Condition is $y = 2D$ when $x = 6D$ or $7D$.
min max

$$\text{Let } V = \frac{V_0}{\sqrt{2}} = V_{0x} = V_{0y}$$

$$\text{Eqs of motion } y = vt - \frac{1}{2}gt^2$$

$$x = vt$$

$$vt_1 = 6D$$

$$t_1 = 6D/V$$

$$y = 6D - \frac{1}{2}g\left(\frac{6D}{V}\right)^2 = 2D \text{ (min)}$$

or

$$y = 7D - \frac{1}{2}g\left(\frac{7D}{V}\right)^2 = 2D \text{ (max)}$$

$$V = \sqrt{\frac{36}{8}gd} \text{ min}$$

$$= \sqrt{\frac{49}{10}gd} \text{ max}$$

so

$$\boxed{\sqrt{9gd} < V_0 < \sqrt{\frac{49}{5}gd}}$$